

REMARKS

Applicants thank the Examiner for acknowledging the claim for priority under 35 U.S.C. § 119, and receipt of a certified copy of the priority document submitted December 19, 2001.

Applicants thank the Examiner for considering the references cited with the Information Disclosure Statement filed November 6, 2001.

Species Election

Pursuant to the Examiner's request at page 3 of the Office Action, Applicant confirms the provisional election of Species I, claims 1-14, with traverse.

Claims 1, 3, 5, 7, 9, 11 and 13 remain pending in this Application, as claims 2, 4, 6, 8, 10, 12 and 14 are hereby cancelled without prejudice or disclaimer.

Drawing Objection

The Examiner has objected to the drawings for informalities. The informalities noted by the Examiner have been corrected by the Proposed Drawing Corrections submitted herewith. Thus, withdrawal of the drawing objections is respectfully requested.

Indefiniteness Rejection of Claims 1 and 2 Under 35 U.S.C. § 112, Second Paragraph

The Examiner has rejected claims 1 and 2 as being indefinite under 35 U.S.C. § 112, second paragraph. Applicants have amended claim 1 to recite "connected" rather than "mounted," and the rejection of claim 2 is rendered moot by its cancellation herein.

Thus, withdrawal of the claim rejection is respectfully requested.

Obviousness Rejections of Claims 1-14 Under 35 U.S.C. § 103(a)

The Examiner has rejected claims 1-14 under 35 U.S.C. § 103(a) as being unpatentable over Sarkhel et al. (US 5,730,932; hereinafter "Sarkhel") in view of Yoshiaki et al. (JP 08-125303A; hereinafter "Yoshiaki"). This rejection is respectfully traversed (the rejection of claims 2, 4, 6, 8, 10, 12 and 14 is rendered moot by their cancellation herein).

Sarkhel discloses (see FIG. 3 and col. 4, lines 52-64) a circuit board assembly 34 with "holes 36 which are plated with metal such as copper" and which contain pins of pin-in-hole components 37, 38 and 39. Top joints 40 and bottom joints 41 are formed of solder.

Yoshiaki discloses (see abstract) a circuit board composed of substrate 1, through-hole 2, through-hole plating 3, lands 4 and solder resist 5 applied from the through-hole land 4 to the through-hole plating 3. Terminal part 7 is inserted in the through-hole 6 and mounted via solder 8. A second terminal 7 is placed in through-hole 9 and mounted via solder 8 in an inner circumference of the through-hole land 4.

Claim 1 - Examiner's Position

The Examiner has taken the position that Sarkhel discloses all of the features of claim 1, except that it "does not explicitly disclose the width of each land corresponding to the difference between the radius of each land and each through hole is set at 0.40 mm or more."

In an attempt to provide such a feature, the Examiner applies Yoshiaki, taking the position that

the width of the land corresponding the hole diameter will depend upon the strength required for that particular conductive connection and will vary depending upon the component and corresponding insert size, type of solder and total fillet length. Further, the opening of the land can be adjusted by controlling the resist or mask opening on the surface to get the desired defect free electrical and mechanical reliability and can be arrived at an optimum value. Yoshiaki disclose a circuit board with various opening of the resist to have the desired defect free connection. Therefore, it would have been obvious to ...

provide the circuit board of Sarkhel with land width with the desired fillet opening as taught by Yoshiaki ... to have a strong and reliable connection without any defect.

Claims 1 - Applicants' Traversal

Applicants respectfully submit that the Examiner's rejection does not provide *prima facie* obviousness of claim 1, as in order "to establish *prima facie* obviousness of the claimed invention, all the claim limitations must be taught or suggested by the prior art." *In re Royka*, 490 F.2d 981 (CCPA 1974). Here, the Examiner has not identified any portion of any of the applied references that teach or suggest that "the width of each land corresponding to the difference between the radius of each land and each through hole is set at 0.40 mm or more," as recited in claim 1.

With respect to the applied references, the Examiner concedes that Sarkhel does not disclose such features. Applicants agree. Thus, in order to support the Examiner's rejection and provide *prima facie* obviousness, Yoshiaki must show them.

However, the Examiner cites no portion of Yoshiaki that teaches or suggests any specific dimensions of any land. Nor does the Examiner cite any portion of Yoshiaki that teaches or suggests any concern for land exfoliation, or of any design with dimensions to reduce such a phenomenon. In fact, Applicants respectfully submit that such a citation is impossible, as although Yoshiaki discloses through holes 2 and 6 formed by NC drill (0.8 mm Φ) (see [0021]), Yoshiaki is silent regarding the size (radius or diameter) of any land.

In fact, the Examiner merely seems to be taking the position that because Yoshiaki discloses through holes and lands of various dimensions that one would somehow have been motivated to modify Sarkhel to provide the specific dimensional relationships of the claimed invention so as to provide a strong connection. However, Applicants respectfully submit that

such a vague disclosure of varying hole and land sizes is ineffective to teach or suggest any specific dimensional relationship. Further, Applicants respectfully submit that Yoshiaki is unconcerned with the specific problem of land exfoliation as disclosed in the instant Application. Specifically (see abstract and FIG. 4), Yoshiaki is concerned with cracking 13 of through hole plating 3, which is clearly not the land exfoliation that is the concern of the instant Application. Thus, Yoshiaki would not be concerned with the provision of specific dimensional relationships to help prevent a problem that it is unaware of.

Further, even if Yoshiaki could somehow be read as disclosing such features, Applicants respectfully submit that the Examiner has not provided any reason why one would have modified Sarkhel in view of Yoshiaki.

Thus, for at least the reasons discussed above, Applicants respectfully request that the Examiner withdraw this rejection.

Claims 3, 5, 7, 9, 11 and 13

Additionally, Applicants respectfully submit that dependent claims 3, 5, 7, 9, 11 and 13 are allowable, at least by virtue of that dependency.


Conclusion

In view of the foregoing, it is respectfully submitted that claims 1-14 are allowable. Thus, it is respectfully submitted that the application now is in condition for allowance with all of the claims 1-14.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Please charge any fees which may be required to maintain the pendency of this application, except for the Issue Fee, to our Deposit Account No. 19-4880.

Respectfully submitted,



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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 2, 4, 6, 8, 10, 12 and 14 are cancelled without prejudice or disclaimer.

The claims are amended as follows:

1. (Amended) A circuit board having circuit wires on the surface and back surface thereof, comprising lands having through holes through which conductive members of electrical parts are inserted, said through holes being coated with a conductive film on the side surfaces themselves,

wherein said lands and said conductive members are [mounted] connected by using lead-free solder and the width of each land corresponding to the difference between the radius of each land and each through hole is set at 0.40 mm or more.